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PATENT  
TS0982 (US)  
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Donald F. Haas

Date: May 20, 2003

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of )

EIT DRENT and WILLEM W. JAGER )

Serial No. 09/804,891 )

Filed March 13, 2001 )

PROCESS FOR THE CARBONYLATION OF )  
PENTENENITRILE )

Group Art Unit: 1623

May 20, 2003

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COMMISSIONER FOR PATENTS  
P. O. Box 1450  
Alexandria, VA 22313-1450

Sir:

RESPONSE

The following remarks are submitted in response to the office action of February 25, 2003. In the action, claims 1-13 were rejected under Section 103(a) as being unpatentable over Slany et al. (DE 19840253-A1 03-2000, which is the equivalent of U.S. 6,346,640, a copy of which is enclosed with this paper). The Examiner states that Slany teaches a process for the production of 5-cyanovaleric acid or its ester which is said to employ very similar conditions to those of the present invention. Slany is said to teach the use of a catalyst system comprising a palladium (II), (a Group VIII metal), a bidentate phosphine ligand, and an anion source which is an organic acid having a pKa of 3.5 or higher. The Examiner states that Slany also teaches that a strong acid, including at least one which is specified in the present application, may also be used.

Claims 14-23 are rejected under Section 103(a) as being unpatentable over Slany et al. and further in view of DiCosimo et al. The Examiner states that this secondary reference teaches the reduction via catalytic hydrogenation of the specified cyano carboxylic acids to the corresponding amino carboxylic acids and their subsequent cyclization to lactam.

The Examiner's rejections are respectfully traversed.

The relevant language concerning the acids in the U.S. equivalent of the Slany reference is found in the last paragraph of column 5 and the first paragraph of column 6. This language corresponds to the language in the original German document.

In the first paragraph, Slany et al. state that "The anion sources used are preferably weak organic acids, for example organic acids having a pKa value of 3.5 or higher, especially sterically hindered organic acids." In the second paragraph, Slany et al. state "It is also possible to use strong mineral acids . . ." This disclosure in Slany means that according to Slany all possible kinds of acids can be used and that weak acids are preferred. In the examples, Slany uses only weak acids. The present invention makes a different selection of acids for use in the invention to get improved results.

There is another substantial difference between the claims of the present invention and the disclosure of Slany et al. All of the claims require that the substitution groups on the phosphorus atoms ( $R^1$ - $R^4$ ) are all tertiary alkyl groups which can be the same or different and can optionally be substituted. Slany does not use any tertiary butyl phosphine ligands in its examples and nowhere in the patent does Slany single out tertiary butyl ligands as being especially preferred, even in the paragraph at column 3, lines 35-51, where one tert-butyl compound is mentioned. In fact, from the examples, Slany shows a clear preference for cyclo octylene groups.

As stated before, the Applicants claims are all now limited in the respect that  $R^1$ - $R^4$  are all tertiary alkyl groups of one kind or another. The Applicants have demonstrated a preference for these groups throughout the application and especially in the first full paragraph on page 11 of the specification where it states that preferably that the tertiary alkyl groups are non-cyclic and are tertiary butyl groups as specified in claim 3.

This issue was addressed in the application in the examples at page 22. The Applicants provided an experimental comparison between the results achieved with the ditertiary butyl phosphino ligand of Example 1 and the diisopropylphosphenyl ligand of Example A. These experiments were carried out under the same conditions. In Example 1, the initial rate was 200, the conversion was 85 percent, the selectivity to cyano esters was 98 percent, and the linearity was 93 percent. Under identical conditions, the Example A isopropyl

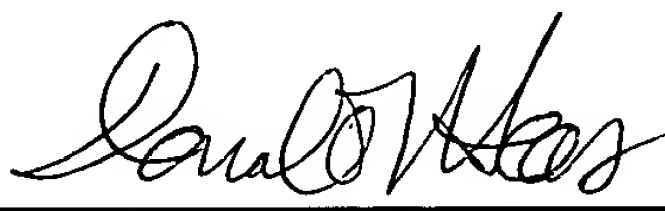
ligand did not perform at all--the initial rate was only a trace, the conversion was less than 2 percent, and the selectivity and linearity could not even be determined. The Applicants submit that this is proof that enhanced results are achieved when one uses the phosphine ligands of the present invention which are clearly a small minority of the very many ligands encompassed within the broad disclosure of Slany et al.

The teaching of DiCosimo is limited to a similarity with steps (ii) and (iii) of claim 14. This reference contains no disclosure or suggestion of the use of the specific tertiary alkyl bidentate phosphine ligands of the present invention. Since, as stated above, these are not taught by the primary reference either, the rejection of claims 14 through 23 should be removed.

The Applicants assert that the primary reference does not suggest or disclose the advantages of using the specific tertiary alkyl diphosphine ligands as opposed to using the very many other phosphine ligands that fall within the scope of the disclosure. The Applicants have proven that their claimed compounds are better than compounds outside of their claims and which are disclosed by Slany et al. Therefore, the Applicants assert that the rejections have been overcome and respectfully request an early notice of allowance.

Respectfully submitted,

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